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(54) Title: METALLOCENE-BASED CHIRAL PHOSPHINE OR ARSINE LIGANDS

(57) Abstract: The present invention relates to metallocene-based phosphine ligands having chirality at phosphorus and at least one other element of chirality (planar chirality and/or chirality at carbon); and to the use of such ligands in asymmetric transformation reactions to generate high enantiomeric excesses of formed compounds. A method for the preparation of ligands according to the invention involving the conversion of the ortho-lithiated substituted metallocene to a phosphine chiral at phosphorus is also disclosed.